

Claims

1. System for purifying exhaust gases of diesel or gasoline engines containing on average an excess of oxygen, **characterized** in that this system includes three operational units being an oxidation catalyst (3, 3'), a particle separator (4, 4'), and an NO_x adsorption catalyst (5, 5', 5''), this system reducing the amounts of hydrocarbons, carbon monoxide, nitrogen oxides and particles present in exhaust gas.
2. System of Claim 1, **characterized** in that the order of the operational units in flow direction of the exhaust gas is as follows: an oxidation catalyst (3, 3'), a particle separator (4, 4'), and an NO_x adsorption catalyst (5, 5', 5'').
- 10 3. System of Claim 1, **characterized** in that the order of the operational units in flow direction of the exhaust gas is as follows: an NO_x adsorption catalyst (5), a particle separator (4), and an oxidation catalyst (3).
- 15 4. System of Claim 1, **characterized** in that the order of the operational units in flow direction of the exhaust gas is as follows: an NO_x adsorption catalyst (5''), an oxidation catalyst (3), and a particle separator (4).
5. System of any of the above Claims, **characterized** in that the exhaust gas discharge line of each cylinder of the engine is connected to a connecting channel (2) wherein said operational units are arranged.
- 20 6. System of Claim 1, 3 or 4, **characterized** in that an NO_x adsorption catalyst (5'') is arranged in the exhaust gas discharge line of each cylinder (7, 8, 9, 10) of the engine, said discharge lines being connected to a connecting channel (12) wherein said oxidation catalyst (3) and particle separator (4) are arranged.
- 25 7. System of any of the above Claims 1 to 4, **characterized** in that the system includes two or more partial systems in parallel, each of them comprising said three operational units (3', 4', 5').
8. System of Claim 1, **characterized** in that the NO_x adsorption catalyst and/or oxidation catalyst are disposed in the same structure with the particle separator.
9. System of any of the above Claims, **characterized** in that the oxidation catalyst (3, 3') contains platinum and/or palladium as catalytic metal(s).

TOP SECRET//EYES ONLY

10. System for purifying exhaust gases of diesel or gasoline engines containing on average an excess of oxygen, characterized in that this system includes NO_x adsorption catalysts that are arranged in each exhaust gas discharge line of each cylinder or in each of the exhaust gas discharge lines of two cylinders.
- 5 11. System of any of the above Claims, **characterized** in that the regeneration of the NO_x adsorption catalyst sulfates, the reduction of nitrates and burning of particles is accomplished by periodically using a lean mixture and a rich mixture.
12. System of Claim 11, **characterized** in that ratio of the duration of the lean phase to that of the rich phase is more than 3, preferably more than 10.
- 10 13. System of any of the above Claims, **characterized** in that said NO_x adsorption catalyst (5, 5', 5'') contains as a catalytic metal platinum and/or rhodium and at least one of the following elements: Ba, Sr, La, Y, Ce, Zr, and possibly at least one of the following elements: Li, Na, K, Rb, Cs, Be, Mg, Ca.
- 15 14. Method for purifying exhaust gases of diesel or gasoline engines containing on average an excess of oxygen, characterized in that the exhaust gases to be purified are passed through a system according to any of the above Claims 1 to 13.
- 15 15. Method of Claim 14, **characterized** in that a lean mixture and a rich mixture are periodically used, the ratio of the duration of the lean phase to that of the rich phase being more than 3, preferably more than 10.
- 20 16. Method of Claim 14 or 15, **characterized** in that enrichments with variable durations are used for the regeneration of nitrates, sulfates and particles such that said regenerations of sulfates and particles preferably last longer than the regeneration of nitrates.
- 25 17. Method for purifying exhaust gases of diesel or gasoline engines containing on average an excess of oxygen, **characterized** in that the exhaust gases to be purified are passed over an NO_x adsorption catalyst allowing for the regeneration of sulfates with a lean-rich mixture, the ratio of the duration of the lean phase to that of the rich phase being more than 3, preferably more than 10.
- 30 18. Method for purifying exhaust gases of diesel or gasoline engines containing on average an excess of oxygen, **characterized** in that the exhaust gases to be purified are

passed over an NO_x adsorption catalyst wherein the regeneration of nitrates, sulfates and particles is achieved by periodically adjusting the mixing ratio of the engine from lean to a ratio closer to stoichiometric, the λ value being preferably below 1.2 and more preferably below 1.15.

- 5 19. Method of Claim 18, **characterized** in that fuel is injected into the engine or exhaust piping upstream of the NO_x adsorption catalyst to obtain a substantially stoichiometric or rich mixing ratio, the λ value being thus below 1.1, preferably 1 or below, more preferably between 0.97 and 1.00.